

# Evaluation of Planting Stock Size to Growth Performance for Conservation Plantings

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## INTRODUCTION:

Tree plantings for conservation practices have been promoted by the USDA's Natural Resources Conservation Service through 2008 Farm Bill programs such as Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), and Wetland Reserve Program (WRP). Successful tree establishment is fundamental in agroforestry practices including riparian buffer plantings, windbreaks, wildlife habitats and silvopastures. In establishing these practices, landowners are planting trees into pastures, crop fields or old fields that are problematic due to competition from weeds, herbivory, and flooding. This study evaluates planting stock size to determine if this may improve the overall survivorship of conservation plantings, while keeping costs down and success rates high. One-year old RPM<sup>R</sup> containerized tree seedlings were evaluated against traditionally grown nursery one- and two-year old seedlings. Five tree species, *Quercus palustris* (Pin Oak), *Quercus rubra* (Northern Red Oak), *Quercus bicolor* (Swamp White Oak), *Acer saccharum* (Sugar Maple), and *Amelanchier canadensis* (Shadbush Serviceberry) were planted in replicated blocks on November 3, 2006. Seedlings were evaluated for survival, height, and caliper growth from 2006 to 2010. After three growing seasons, the hardwood tree species, for all sizes, had above 90% survival, on average. Overall height and caliper growth, after 3 years, was highest for RPM trees (also started off larger). One-year old seedlings had the fastest height growth rate.

## MATERIALS AND METHODS:

All trees were planted on November 02, 2006, on an Unadilla silt loam soil, located in at the Big Flats Plant Materials Center in Corning, New York. The RPM trees were supplied by the Cornell Horticulture facility in Dryden, NY and the 1-yr old bareroot and 2-year old containerized plants were from Octoraro Nursery in Oxford, PA. The field, prior to planting, was a perennial pea production field which was removed in 2004. The field was fallowed the next 2 years and was then disked and roto-tilled before planting.

Swamp white oak, sugar maple, pin oak, red oak, and shadbush serviceberry were planted in 4 replicated, randomized complete blocks, with 3 trees of each species in each replication. One-year old bareroot trees had Tubex tree tubes placed over them for protection and the other stock types had white hard plastic wrapped around the bark. Tree heights and caliper growth measurements were taken at planting, and in the fall for the next 4 years, to assess the differences in each stock type. Caliper measurements were taken at 1 and 1.5 inches above the ground and heights were measured to the top of the tree. Other factors taken into account, were deer browse and buck rub effects, as well as canopy width and girdling.

## RESULTS:

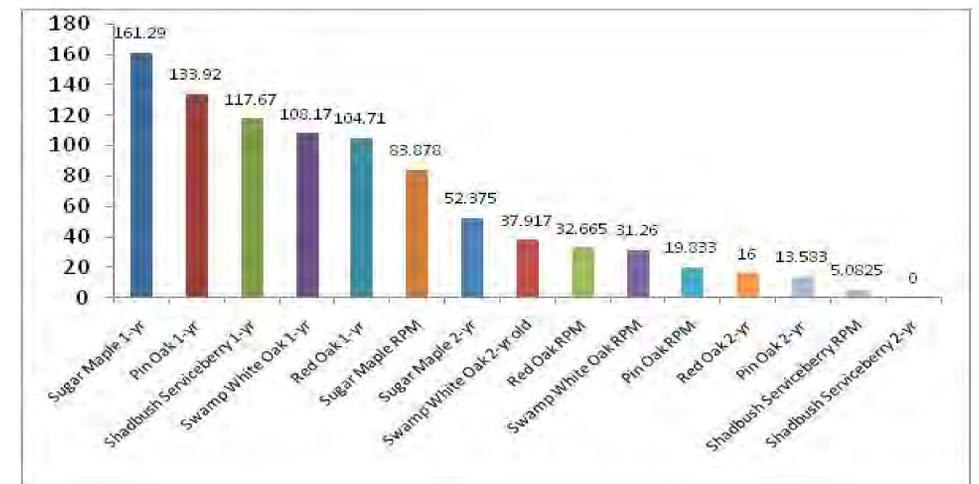


Figure 5. This graph depicts the overall height growth rate (in cm) for all tree species, averaged in each rep, planted after 4 years of data. All of the bareroot cutting species, grew faster than the other two stock types, which is typical of trees that are initially smaller when planted.



Figure 1: Initial root ball sizes taken in 2006. On the left is the RPM trees, with an already advanced root system, middle tree is from the 2-yr old nursery containerized stock, and the tree on the right shows the 1-year old bareroot cutting, depicting very little roots.



Figure 4. Picture taken in 2010 of the 1-yr old bareroot swamp white oak trees. Tubex tree tubes protected these from deer browse,



Figure 2: 2006 initial planting of RPM trees, 2-year old trees from Octoraro Nursery (same age as RPM), and 1-year seedlings, at the Big Flats Plant Materials Center in Corning, NY.



Figure 3: Photo taken mid-summer 2010. 1-yr old bareroot (with Tubex tree tubes) put on significant height growth in 4 years, while 2-yr old and RPM, had slower growth rates.

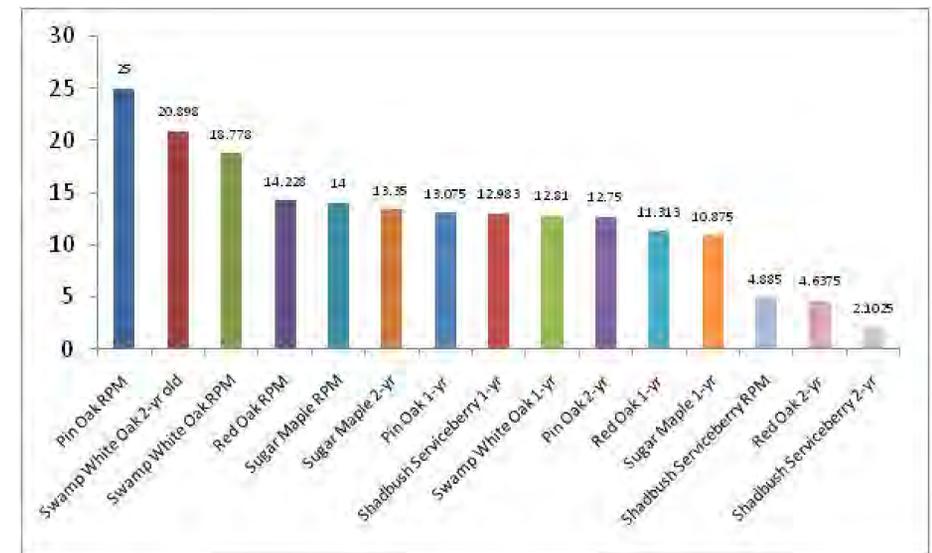


Figure 6. This graph shows the caliper growth rate (in mm) after 4 years. Caliper growth measurements were taken 1.5 inches from the ground surface. Overall the RPM stock trees, put on greater caliper growth than the other stock types.

## CONCLUSIONS:

Using 1 year old bareroot cuttings, protected by tree shelters, provided faster height growth rates for the trees species tested. Even though the caliper growth rates were higher for the RPM and 2-year old containerized trees, when compared statistically, the results were not significant, except for trees that were severely damaged by rodents or deer. Using bareroot cuttings may be more economical than using the more expensive containerized trees, for large scale afforestation plantings.

This site will be further examined for long term survival of each tree species and stock type. Long-lasting success is the main goal for conservation practices, such as CRP, WRP, and CREP, promoted by USDA-NRCS.